



OUR LOCAL
CORRESPONDENTS

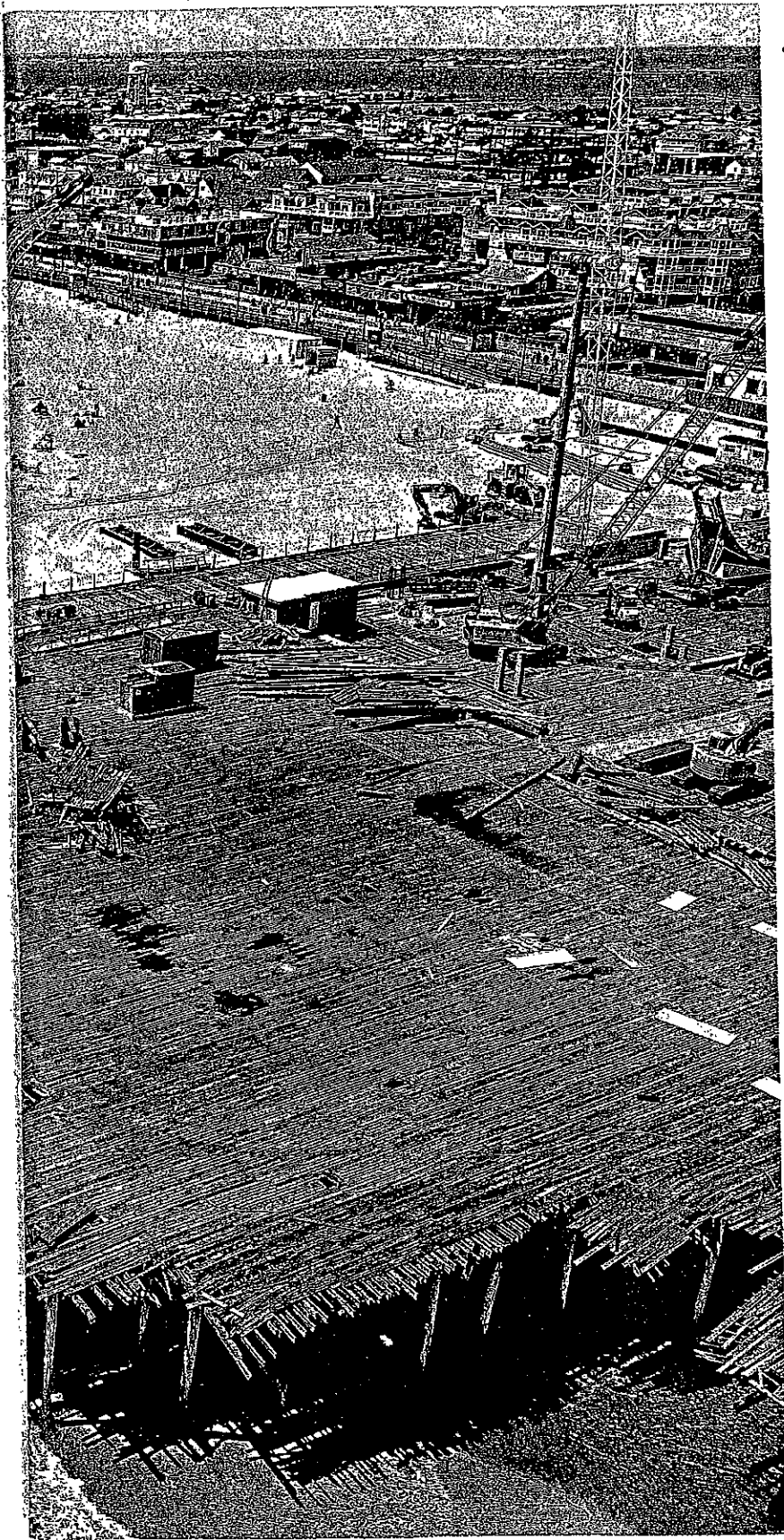
THE BEACH BUILDERS

Can the Jersey Shore be saved?

BY JOHN SEABROOK

Repairing storm damage in Seaside Heights. The Jersey Shore was the first developed coastline in the United States, but its building

PHOTOGRAPH BY GEORGE STEINMETZ



berently precarious, because beaches and barrier islands aren't naturally permanent.

Jonathan Oldham is the mayor of Harvey Cedars, a small town on the Jersey Shore. He grew up there, on Long Beach Island, where his father, a Presbyterian minister, ran the well-known Bible Conference. He is just old enough to remember the Ash Wednesday Storm, the March, 1962, nor'easter that was, until recently, the worst storm in living memory to strike the Shore. Because it lingered for five high tides, it was also known as the Five High Storm. Jonathan, his parents, and fifty of the town's residents found shelter at the Bible Conference complex, which was on higher ground. From there, they watched the destruction of Harvey Cedars.

In the town's Borough Hall, where I spoke with Oldham recently, there are several dozen black-and-white pictures of the devastation the storm left behind, uniformly framed and spaced along all four walls, a grim Presbyterian reminder of the doom that awaits us all. In the photographs, the tops of three-story houses can be seen bobbing like corks in the waves.

"My mother took that shot right there," Oldham said, pointing to a photo taken from the Bible Conference. The ocean has cut a wide channel straight through the narrow barrier island to Barnegat Bay. "So, you see, for those of us who have been here for a long time, this is the demon that we've lived with, and it was never a matter of *if* a storm of great magnitude would come, it was always a matter of *when*."

That was the conviction that Oldham brought to the mayor's office, a volunteer position to which the town's three hundred and thirty residents elected him in 1997. Like virtually all the beaches along New Jersey's hundred-and-twenty-seven-mile coastline, the natural beach at Harvey Cedars had eroded away long ago. The town had been putting sand on the beach from time to time, but it never stayed there long; after the '62 storm, the Army Corps of Engineers rebuilt the beach, but eventually that eroded, too. With no sandy buffer to protect it, except for the low dunes that municipal workers had bulldozed into place, the town was terribly exposed to storms. "We were very vulnerable," Oldham told me. By the time Oldham became mayor, there was often a six-foot cliff at the base of the dunes, where the beach had been; at high

tide, waves slapped against the dunes, which were all that separated the ocean from the oceanfront properties.

Fortunately, salvation was at hand, in the form of "the Project." The Army Corps of Engineers had secured funding to build a wide beach at Harvey Cedars, a berm that would stretch not less than a hundred and twenty-five feet from the back of the beach to the water's edge. The Corps would also create dunes, rising at least twenty-two feet above sea level, which is the projected height of the waves in a hundred-year storm. The Saharan amount of sand needed for this operation, 2.7 million cubic yards (a large dumpster holds thirty cubic yards), would be dredged from an offshore "borrow site," pumped to the beach, and sprayed and bulldozed to conform to the Corps's design specs. The Project would cost nearly twenty-six million dollars, but Harvey Cedars would pay very little: the federal government was picking up about sixty-five per cent of the cost, and the state nearly thirty-five per cent, leaving the town responsible for barely one per cent. Best of all, the Corps was offering to "nourish" the beaches and dunes with more sand, as the need arose, for the next fifty years, apparently guaranteeing the town's residents a wide beach for their lifetimes and beyond.

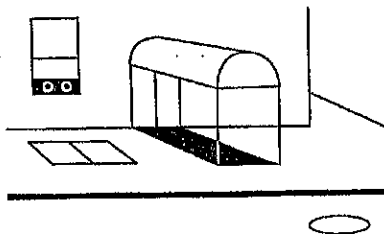
There were conditions. In order to get the Project, the beachfront owners would have to sign easements giving the government the right to build the dunes on their property. The landward toe of the dune would sit on the non-buildable, riparian portion of their real estate, and the crest of the dune would block their view of the ocean from the main floor, unless the house was elevated. The easements also gave the Corps and the State of New Jersey the right to access the property "in perpetuity" in order to maintain the dunes. And Harvey Cedars was required to make the beach accessible to the public and to conform to federal guidelines governing water quality, beach grooming, placement of Porta-Potties, and so on.

The majority of residents signed the easements readily. The protection the Project offered outweighed their reservations about federal encroachment on their land and privileges. When homeowners objected to one aspect or another of the Corps's plan, Oldham would in-

voke his experience with the Ash Wednesday Storm. "I'd be talking to this guy and he'd say, 'Yeah, I don't know if I'll sign the easement, because I like to see the ocean from my deck,' and I'd say, 'Well, do you want to *have* a deck?'" By the end of six months, Oldham had managed to get ninety-three per cent of the easements signed.

Twelve holdouts remained, however, and they didn't seem likely to budge. The Corps would not undertake the Project unless all the easements were signed. After about a year of fruitless wrangling, Oldham resolved that the town had to act. "We were in a vulnerable position, and it got to a point where we decided to take a calculated risk, so we went to eminent domain," he said. In eminent domain, which municipalities often invoke in building roads, the government takes private land for the public good, in return for "just compensation." "We went onto people's property and built a dune to protect their home," Oldham explained. The Project was finished in time for the 2010 summer season.

Among the holdouts were Harvey and Phyllis Karan, an older couple, who, like most beachfront owners, were seasonal residents. Their place, on Sixty-eighth Street, is a three-story wooden house with a gabled roof and a white-bannistered deck that runs around the raised main floor. They liked to sit there and watch their grandchildren play on



the beach. After the Project, they looked at a weedy sand pile. The Karans wanted compensation for their lost view, which, their lawyer, Peter Wegener, argued, diminished the value of the \$1.9-million house by five hundred thousand dollars. Harvey Cedars offered them three hundred dollars at first, and later raised the amount to seven hundred dollars. The Karans went to court, and a jury heard the case in 2011. The attorney for Harvey Cedars, Lawrence Shapiro, con-

tended that the Project had added the value of security to the house, which offset the value of the lost view. Wegener argued that the whole town benefitted, while the Karans' property value suffered the loss. The judge in the case ruled that the jury could consider the dune only as a general benefit to everyone in the town. Not surprisingly, the jury decided that the Karans had been unfairly saddled with the cost of the dune, for the benefit of all, and, after visiting the house and taking in the lost view from the deck, the jury awarded them three hundred and seventy-five thousand dollars. The case went to the Appellate Division, in Trenton, and, in March, 2012, the verdict was upheld.

"When we were losing in court," Oldham told me, "I really started to question myself. Was it really the right thing to do, to take these people's property?" But he'd always come back to the Ash Wednesday Storm. "Because, in my world, this didn't make any sense. People who don't live here year-round, who only come when the weather's nice, they don't understand how bad it can be." The town pursued the case to the New Jersey Supreme Court. Harvey Cedars could manage to pay the Karans for their view—the town had privately settled with other holdouts. But by now many other coastal communities on the Shore, which also wanted the Project, couldn't get all their easements signed, either, because some property owners thought they could hold out for a Karan-like payment.

Then, on Monday, October 29, 2012, came Sandy, the doomsday storm that had haunted Oldham for fifty years. (Following in his father's footsteps, he now runs the Bible Conference, where his family sheltered in 1962.) In all, the storm was estimated to have removed some thirty-seven million cubic yards of sand from the beaches of New York and New Jersey, according to Cheryl Hapke, of the U.S. Geological Survey. Towns that had the Project—Harvey Cedars, Surf City, and a section of Brant Beach—came through the storm with relatively minimal damage. Towns without the Project, such as Holgate and, north of the Barnegat Inlet, Mantoloking and Ortley Beach, were badly damaged. The Karans' property came through largely unscathed. The dune, which was washed

away like a sand castle (temporarily restoring the Karans' view), performed as it was designed to. However, although the offensive dune had saved their house, the Karans' bid to be compensated for their lost view continued.

The Jersey Shore was the first developed coastline in the United States. The Shore was where Americans learned to love the beach, an infatuation that would shift our national identity away from the rugged stoicism of the pioneers and toward the hedonism and exhibitionism of this day—"life's a bitch" became "life's a beach."

The Shore was Florida before Florida existed. Disneyland and Las Vegas might never have been conceived without Atlantic City, which had its heyday in the first decades of the twentieth century, or Wildwood, which was in its prime from the twenties through the sixties, when I went to the Jersey Shore with my parents. I remember that first sight of the ocean. We'd drive through miles and miles of scrubby pine trees and sand, and then the blue would fill the windshield and there it was: the ocean, the beach, and the sky. We rented a house in Avalon, from which you could hear the sea all day and night, crashing and seething.

In the seventies, partly thanks to the success of those latter-day vacation spots, some of the Shore's landmark tourist attractions entered a long period of decline, which mostly continues to this day. There are more than forty Shore communities, whose inhabitants are a blend of wealthy out-of-towners on the beach, local merchants and businessmen, and, several blocks inland, low-income families, many living in Section 8 housing. Religious communities like Ocean Grove, a Methodist settlement, sit hip-to-hip with fleshpots like Asbury Park.

In addition to teaching Americans to love the beach, the Shore has been a laboratory for developing standards and practices in coastal engineering, many of which were later applied elsewhere, for better or worse. Orrin Pilkey, a distinguished coastal scientist and author from Duke University, calls the state's approach to coastal engineering "New Jerseyization." The term is not complimentary. In his 1996 book, "The Corps and the Shore" (written with Katharine



"I'm just like any other politician in the race—I take my pants off one leg at a time."

Dixon), Pilkey writes, "The long seawalled beaches of New Jersey, covered by the clutter of previously destroyed walls, are arguably the most unsightly beaches in the world."

Most of the Shore is built on sand spits like Long Beach Island, or L.B.I., which are in many places less than two hundred yards wide. (Long Branch, Asbury Park, and Cape May are the only Shore cities that are situated on the mainland.) Had the barrier islands never been developed, they would form natural buffers between the sea and the mainland. But, as America's infatuation with the beach grew, so did the value of proximity to it. A house with an ocean view is prime real estate, no matter how shoddily constructed; in Harvey Cedars, Peter Wegener told me, the exact same house is worth sixty per cent less if it's behind the house with the view. Boardwalks, which were built to keep sand on the beach, became popular promenades (they were called "flirtation walks") and promoted ever more elaborate amusements, restaurants, and games of chance, culminating in the high-rise hotels (now casinos) in Atlantic City.

The problem is that beaches and barrier islands aren't permanent. They move as wind and water reshape them. (Exactly how sand moves in water is a matter that even the most complex mathematical models don't really explain.

Einstein reportedly advised his son Hans not to pursue a career in sedimentary transport, because it was too complicated.) Coastal engineers are tasked with keeping these capricious sand piles in place. The Shore's formative years, around the turn of the twentieth century, were relatively quiet ones for Atlantic hurricanes. But, in the nineteen-thirties, a number of strong storms struck the Shore, followed by a disastrous hurricane in 1944. These storms revealed just how vulnerable and foolishly situated much of the development was. With so much invested in the oceanfront already, retreat was unthinkable; increased coastal defense was the only option. Both private-property owners and public-works departments armored the Shore with jetties and groins, which extend at a right angle from the beach, into the ocean, and with seawalls, which are placed at the back of the beach and are generally made out of heavy timber, reinforced concrete, and large rocks.

These structures succeeded, temporarily at least, in protecting the buildings. But armoring turned out to be bad for the beaches. Seawalls violently repelled wave energy, which churned up the sand and sucked it out to sea. The jetties and groins also impeded the "littoral drift"—the giant floating beach that waves push up and down the coast—blocking sand from going to neighboring towns (these

structures are sometimes called "spite groins"). Starved of sand, the most heavily armored towns soon had no beach at all, which was the whole reason that the Shore had been attractive in the first place. At that point, the process of New Jerseyization was complete.

In the nineteen-sixties and seventies, coastal-engineering philosophy shifted, as reflected in "Design with Nature," an influential book by the Scottish landscape architect and writer Ian McHarg. The new thinking advocated protecting coastlines with less invasive "soft structures," such as beaches and dunes. Even the word that engineers used for beach building, "nourishment," suggested a holistic, almost maternal concern for a beach's well-being. Unlike a seawall, a beach absorbs wave energy as the water sinks into the sand, and a dune spreads and dissipates the wave along its hips and shoulders, rather than flinging it back against the next wave. Of course, the hard structures built by previous generations of coastal engineers remained in place, which meant that the artificial beaches were likely to erode more rapidly, and would have to be continually replaced. But with so much of New Jersey's economy based on beach tourism, political leaders had no choice but to persist in this Sisyphean task.

The precursor to the Army Corps of Engineers was formed in the eighteenth century, by George Washington and the Second Continental Congress, to assist in designing and building fortifications during the Revolutionary War. In peacetime, Corps engineers dredged inlets and rivers, built levees and dikes, maintained ports, and assisted in waterborne commerce. The Corps began building artificial beaches in Ocean City, New Jersey, in the nineteen-fifties, and became more involved after the Ash Wednesday Storm of 1962. Since then, many of the great beaches of the East Coast, from Martha's Vineyard to Miami Beach, have been nourished. (On the West Coast, where, as long as the rivers are not dammed, there is lots of new sediment washing into the ocean from the mountains, beaches tend to last longer. On the East Coast, where the mountains are much older and lower, there isn't much fresh material to replace what's carried out to sea.) Nourishment works

THE MORNING AFTER

You stand at the counter, pouring boiling water
over the French roast, oily perfume rising in smoke.
And when I enter, you don't look up.
You're hurrying to pack your lunch, snapping
the lids on little plastic boxes while you call your mother
to tell her you'll take her to the doctor.
I can't see a trace of the little slice of heaven
we slipped into last night—a silk kimono
floating satin ponds and copper koi, stars falling
to the water. Didn't we shoulder
our way through the cleft in the rock of the everyday
and tear up the grass in the pasture of pleasure?
If the soul isn't a separate vessel
we carry from form to form
but more like Aristotle's breath of life—
the work of the body that keeps it whole—
then last night, darling, our souls were busy.
But this morning it's like you're wearing a bad wig,
disguised so I won't recognize you
or maybe so you won't know yourself
as that animal burned down
to pure desire. I don't know
how you do it. I want to throw myself
onto the kitchen tile and bare my throat.
I want to slick back my hair
and tap-dance up the wall. I want to do it all
all over again—dive back into that brawl,
that raw and radiant free-for-all.
But you are scribbling a shopping list
because the kids are coming for the weekend
and you're going to make your special crab-cakes
that have ruined me for all other crab-cakes
forever.

—Ellen Bass

better on some beaches than on others. No two grains of sand are the same, and beaches have different characters depending on the kind of sand they're made of. Miami's nourished beach has fared pretty well, partly because its sand grains, with a high proportion of crushed shells and coral amid the pulverized rock, are small, and they pack together firmly; that's why the beach is so hard. New Jersey beaches, which consist of coarser sand made from ground-up rock, tend to erode far more quickly.

Since 1970, the Corps has nourished beaches, mostly on the East Coast, four hundred and sixty-nine times, placing more than three hundred and seventy

million cubic yards of sand on them, at a cost of \$3.7 billion in today's money, the bulk of it paid by taxpayers who don't live anywhere near the ocean. As Andy Coburn, a coastal scientist at Western Carolina University, who provided these figures, noted in an e-mail, "The cost of nourishment, measured on a per unit basis, has steadily increased from the 1970s (\$1.71/cubic yard of sand) to now (\$14.38/cubic yard of sand), and the projected future cost of nourishment will continue to go up as demand increases and as the easiest-to-get, best-quality sand is used up." However, in the near term at least, the Corps has plenty of money. Earlier this year, Congress gave the Corps \$5.4 billion

"for necessary expenses related to the consequences of Hurricane Sandy"—much more than it has spent on beaches since nourishment began.

One bitterly cold day last January, the Corps was working at Sea Bright, in Monmouth County, replacing the beach that Sandy had erased. I rode to the site from the city with Lynn Bocamazo, the chief design engineer on the Project, and Dan Falt, its manager. Bocamazo, who is in her early fifties, has brown hair and glasses, and the demeanor of an enthusiastic science teacher. We parked in the empty lot of Moby's, a local seafood joint. The wind coming off the ocean made my eyes water. No tourists were around, but there were a lot of contractors, warming themselves in their big pickups, drinking coffee. We put on hard hats, safety vests, and goggles, and negotiated the icy gangway onto the small boat that would take us out to the dredge.

Sea Bright has a plausible claim to being the spot where Americans' dangerous liaison with the beach started in earnest. A beachfront hotel capable of accommodating three hundred people, the Ocean House, was built in 1842; patrons arrived from New York by steamboat. By the turn of the twentieth century, a rail line brought the city's huddled masses to the Sea Bright beach, a short day trip. In 1931, a seventeen-foot-high seawall was completed from Sea Bright to Monmouth Beach, to protect the oceanfront houses. Eventually the rail line was abandoned and removed. The wall remained, and it accelerated beach erosion, earning Sea Bright a new distinction as one of the first beachless beach towns.

The Corps has nourished the beach at Sea Bright twice since 1995. It is supposed to be re-nourished every six years, but, when Sandy hit, ten years had passed since the last nourishment; the state had decided that other beaches were in more dire need of the sand. By 2012, as Bocamazo put it, the Sea Bright beach was "not in its designed condition." It had lost some nine hundred thousand cubic yards of sand. The beach was scheduled to be re-nourished early in November, 2012—as it turned out, just a few days too late.

During the morning of October 29th,

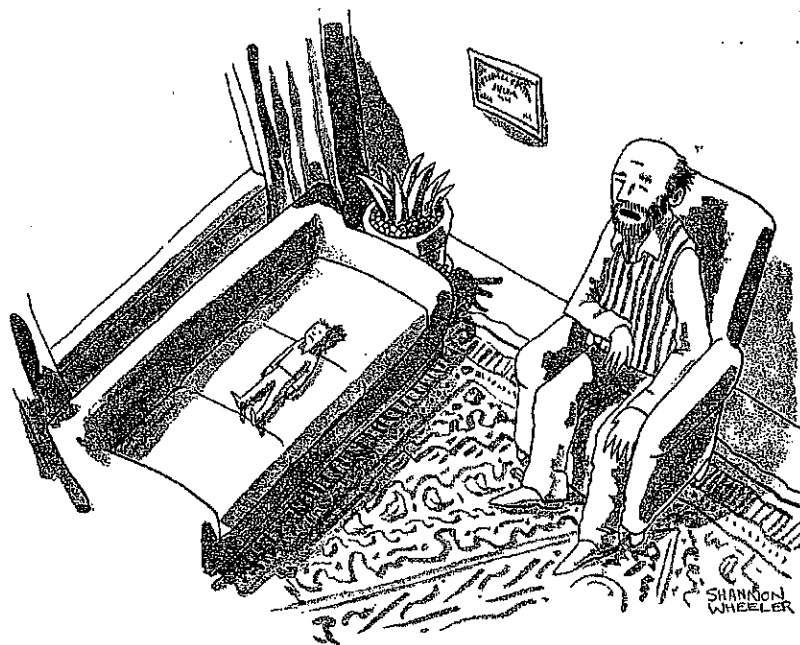
waves as high as twenty-eight feet crashed into Sea Bright. What remained of the engineered beach did little to stop them. Stewart Farrell, a coastal scientist at Richard Stockton College of New Jersey, told me, "The storm simply bulldozed the sand up against the seawall and used it as a ramp to launch waves onto the houses on the other side," flooding the town with five feet of water and flinging tons of sand onto Ocean Avenue and the streets behind it. (Snowplows were deployed to clear the streets afterward.) The damage to homes and businesses was catastrophic. I asked Bocamazo whether Sea Bright might have been better protected had the beach been nourished sooner. She said it wouldn't have mattered, because "the water level was so high it just came over the beach." She added, "Sandy overwhelmed the project, especially in Sea Bright."

Bocamazo, a hydraulic engineer with a degree from Cooper Union, has been with the Corps for twenty-nine years. She was the engineer on the original Sea Bright nourishment project, in the nineties. On the ride out to the dredge, she explained some of the challenges of beach design: "First, you need a lot of sand." To re-nourish the twenty-one miles of coastline from Sea Bright to Manasquan will require twenty-two mil-

lion cubic yards of sand. New Jersey gets its sand from the remains of a beach, now a couple of miles offshore, that was created by the Wisconsin glaciation during the last Ice Age, when the sea level was almost sixty feet lower. "You try to match the sand to the beach," Bocamazo continued. If you placed smaller-grained Florida sand, sometimes called sugar sand, on Jersey beaches, it would erode even more rapidly. North Carolina put sand that contained cobbles of limestone, about the size of grapefruit, on the beach at Oak Island in 2001, and the beach has never recovered.

The dredge was named the Dodge Island, and was owned by Great Lakes Dredge and Dock, of Oak Brook, Illinois. The ship is two hundred and sixty-six feet long and weighs about thirty-two thousand five hundred tons. From the bridge, where the captain and his officers worked under a large glass canopy, one could see down into the dredge's hopper, which is capable of holding some thirty-five hundred cubic yards of sand at a time.

As we reached the borrow site, the underwater sonar showed the contoured bottom of the sand deposit, which varied from thirty-five to sixty feet below the surface—the remains of primeval dunes and, possibly, barrier islands long ago submerged by the rising sea. It was a



"You need to stop comparing yourself to other people."

chilling glimpse into the Shore's distant future.

There were two big drag heads, one on either side of the ship, which vacuum sand from the seafloor. When we were right over the borrow site, the heads were lowered in and started blasting the seabed with jets of water, to loosen the sand and make it easier to suck up. Before long, a gray slurry of water and sand began to pour into the hopper.

Watching the hold fill, the dredge's captain, George Hoffman, said, "Some sand just jumps into the hopper, some you got to work."

When the hopper was full, we took the small boat back to the beach, while the dredge made its way toward the pumping station. There the crew attached a half-mile-long, thirty-six-inch-wide pipe that ran along the bottom of the ocean to the beach. When they were finished, the sand would lie up to fifteen feet deep, with a two-hundred-foot-long berm raised to twelve feet above mean low water, a one-to-twenty slope to the water and a one-to-ten slope after that. If the berm were any higher, the beach would "scarp," or form small ledges; any lower and tidal pools would collect on it.

A worker yelled, "Water on the hill!" as the gray slurry from the Dodge Island began to spew through a three-quarter-inch-mesh screen intended to catch large rocks and other objects. (The borrow site is near an old artillery practice range off Sandy Hook, and the dredge sometimes sucks up unexploded ordnance.) A loader and a couple of bulldozers were working down on the beach, moving the sand around. On a finished section, an excavator was smoothing the bulldozer tracks out of the sand by dragging a section of pipe. A long hill of sand constructed by the Corps caught and diverted the slurry so that it couldn't run off the beach and back into the ocean. Great Lakes is paid only for the sand that can be measured on the beach, so the workmen wanted to keep the sand there until a large three-legged contraption called the CRAB, which stands for Coastal Research Amphibious Buggy, could be maneuvered into place to measure the beach's profile.

The work went quickly, and by the end of the day the re-nourishment of Sea

Bright was nearly complete. There was a brand-new, totally artificial beach, where future memories would be made.

In the months after Sandy, people who hadn't signed their easements were the villains of many a town-hall meeting along the Shore. Not only were their fellow beachfront owners furious with them; so were inland residents whose houses were also damaged because there were no dunes. The mayor of Long Beach Township, Joe Mancini, proposed that the holdouts should have to pay for the cleanup around their homes. He also published their names on the town's Web site. "I view this as a public-safety issue," he told me. "Neighbors had a right to know they were living next to a holdout."

The Governor himself showed up at an April 30th town-hall meeting on L.B.I., and took on the issue of easements in classic Chris Christie form. Addressing beachfront owners' concerns that making the beaches accessible to the public would lead to commercial development, he said, "I don't want to build a hut. I don't want to build anything except a dune, O.K.?" Warm applause followed. Christie continued, "Any knucklehead neighbor of yours who's telling you, 'Uh-oh, you sign that easement, Christie's comin' in here buildin' showers for people, a bathroom, a hot-dog stand, before you know it there's going to be a Dairy Queen'... Let me use a word that's indelicate." Now fully in his element, the Governor admonished the children in the room to cover their little ears. "It's bullshit! That's what it is!" he roared. "Here's why they're really concerned. They don't want their view blocked!" He noted the three hundred and sixty-five thousand houses that were destroyed, the memories washed away forever. "We are not going through that again, so that you could sit on the first floor, rather than the second floor, and see the ocean!"

The state Department of Environmental Protection has been promoting an ambitious plan to gird nearly the entire Jersey Shore, from Bay Head to Cape May, with engineered beaches and dunes. But, of the two thousand easements needed to buffer the state with dunes, only about eight hundred had been signed. Christie had signalled that

the state would take over the risk of invoking eminent domain on the holdouts, but so far that remained the towns' responsibility. A great deal depended on whether or not the three-hundred-and-seventy-five-thousand-dollar award that the Karans received for their lost view was upheld.

The state Supreme Court heard arguments in May, in a courtroom in Trenton. The justices questioned the attorneys on both sides closely about whether or not the dune constituted a special benefit to the Karans or a general benefit to the town. The commissioner of New Jersey's D.E.P., Bob Martin, was in the audience; later, he told reporters that the case "is extremely important for the state over all—we want to make sure that we recognize the value of these dunes." Mayor Oldham told me he was encouraged by the line of questioning that the justices pursued. "I don't know how you can say, post-Sandy, that the dune wasn't a specific benefit to the Karans' house. I mean, go look at it. It's standing!"

The justices agreed with him. Last week, they overturned the Karans' award, saying that it "disregards the home's enhanced value resulting from a public project." They sent the case back to Superior Court for a new trial. Phyllis Karan told the *Newark Star-Ledger* that she wasn't sure she and her husband would continue with the suit, adding that their interest had never been the money. "All we wanted was our view," she said.

But does the Project really work? And would the Project, were it to be applied all along the Shore, actually protect New Jersey? Orrin Pilkey, the Duke coastal scientist, has called beach nourishment a "sham," because artificial beaches rarely last as long as the Corps claims they do, and because the Corps's beach-design principles are unproven. The raised profile of the Corps's beaches means that waves hit them harder, he told me, which causes them to erode more quickly. "Basically, beaches are made by throwing sand up on the beach and hoping for the best, despite a costly design process," he said. (Surfers also dislike engineered beaches, because the waves break on the shore, leaving little to ride; also, the steeper beaches have been known to cause neck injuries when

swimmers hit them.) Pilkey and the Corps also disagree about where the sand that erodes from nourished beaches goes. Is much of it washed far out to sea, as Pilkey says, rarely to return? Or does it mostly stay on the Jersey Shore, as the Corps maintains, drifting north and south and collecting in substantial deposits at Sandy Hook and Cape May?

Pilkey's larger objection to beach nourishment is that it encourages development, and clouds the public's appreciation of the risks that come with an ocean view. Thanks to the ready availability of the Project, the long-range solution to New Jersey's coastal problems, which is to pull back from the barrier islands, has not been seriously discussed at a policy level. Inevitably, there will be more development, including, perhaps, high-rise condos. "High-rises are the single most important roadblock to any

sort of flexible response to sea-level rise," Pilkey wrote in an e-mail. "They can't be moved even if there was a place to move them. To demolish them would put all sorts of stuff into the water. It puts New Jersey right in the hopeless camp of Florida, where they have hundreds of miles of high-rise-lined shorelines. They don't have a prayer."

Mark Mauriello, a geologist who was the D.E.P. commissioner under Governor Jon Corzine, told me, "The problem is you nourish and then people have the feeling of security and come right back, the beach erodes, and then you have another storm."

Rob Thieler, a research geologist with the U.S. Geological Survey in Woods Hole, Massachusetts, raised other questions about the dredging involved in building man-made beaches. "How much seafloor disturbance can

you do before you interfere with fish-spawning habitats?" He also pointed out that some of the best underwater sand-mining sites are already supplying beaches with sand, under natural processes. "Which raises the issue of resource utilization. Are you using the resource in ways that are going to substantially alter the natural patterns that are mitigating the erosion process already?" I asked Thieler if he considered nourishment a long-term sustainable solution to coastal protection. "I don't think we have a complete understanding of what the long-term costs and benefits and physical sustainability are," he replied.

Sea-level rise, or S.L.R., and the increased severity of storms as a result of climate change (by the end of the century, hundred-year events like Sandy could likely occur every ten years or so) are the variables that make gauging the Project's long-term prospects difficult. The central range of estimates calls for the ocean to rise between seven and sixteen inches by 2050; the upper range, which factors in the rapid melting of the Greenland and West Antarctic ice sheets, is around twenty-four inches. By 2100, the intermediate high estimate is 3.9 feet and the highest 6.6 feet. "Are these islands going to migrate, are they going to disintegrate, or some combination of that?" Thieler asked. "Do we have enough sand to hold them in place? Again, I don't think we know the answer."

At what point does the cost of keeping the Jersey Shore from being inundated, using both soft and hard structures, surpass the cost of abandoning the barrier islands and pulling back? I asked James E. Neumann, an owner of Industrial Economics, a private consulting firm in Cambridge, Massachusetts. He and his colleagues have created a model that shows the economic impact of sea-level rise on developed coasts around the country. "Beach nourishment won't be sufficient for S.L.R. above about one foot," he replied. "At that point, if you want to keep a beach, you'll have to keep raising the profile of the beach to keep up with a rising sea and build a hard structure—such as a seawall—behind it to control periodic storm surges." (Indeed, since Sandy, a lot of Shore towns have discussed building seawalls, and Bay Head has already extended its wall.)

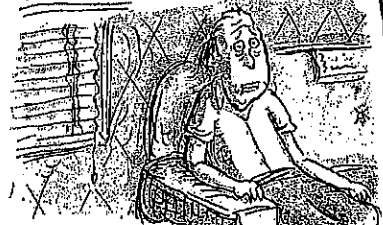
THE JERCK MANUAL

CLICKANOSIS

Symptom: Persistent clicking noise in ear!!!

Diagnosis: Wind is rattling venetian blind.

Treatment: Adjust blind.

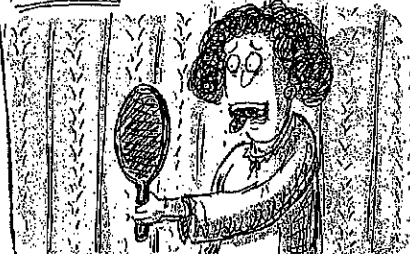


TONGUECHONDRIA

Symptom: Tongue feels funny!!!

Diagnosis: Patient is overmonitoring his or her tongue.

Treatment: Don't think about tongue.

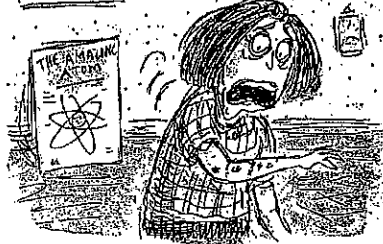


NITWIT SYNDROME

Symptom: Purple and turquoise spots all over arm!!!

Diagnosis: Backed into daughter's science poster.

Treatment: Soap and water.

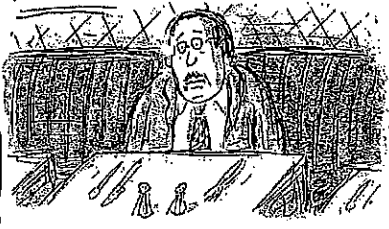


RESTAURANT BLINDNESS

Symptom: Everything's going dark! AAAAAGGH!!!

Diagnosis: Restaurant employee dimmed the lights.

Treatment: None. Just... forget it.



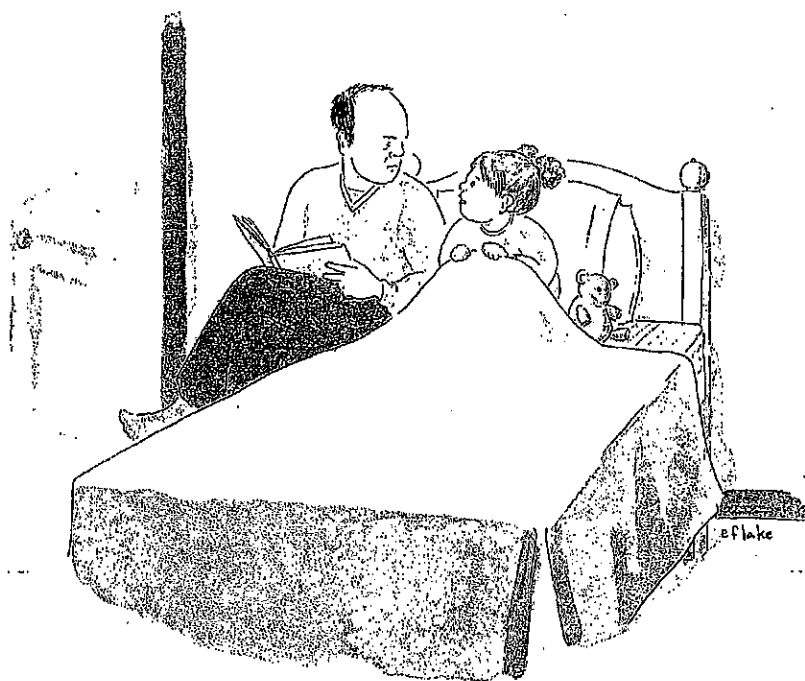
P.C.R.

Neumann went on, "Will people still want to live near the beach if the environment is so highly managed by engineering?" However, according to his model, which extends to 2100, he said, "The property values are so high, and the density of property value so high, in many parts of the barrier islands in New Jersey, that these areas are never abandoned in our study period."

If the federal government tires of paying for the Project—Presidents as far back as Bill Clinton have tried to get the government out of the beach-building business, only to butt heads with powerful political interests in coastal states—will the beachfront owners and shore towns pick up the cost themselves? And will the thing that made these properties valuable in the first place, which is the view of the ocean, continue to command a premium? After a couple more hundred-year storms, people may not look at an ocean view the same way they do now. They may see only the menace.

Governor Christie has spoken eloquently about rebuilding the Shore. "As a kid who was born and raised in this state and who spent a lot of time over my life—both my childhood and my adult life—at the Jersey Shore, we'll rebuild it. No question in my mind we'll rebuild it," he said the day after Sandy. He browbeat the U.S. Congress into passing a generous Sandy relief package. The storm and its aftermath generally showed Christie at his best, and if he goes on to capture the Republican Presidential nomination in 2016 he'll have Sandy to thank.

Christie has said very little about efforts to adapt to climate change. He has yet to give anything close to the speech that Mayor Bloomberg delivered in June at the Brooklyn Navy Yard, outlining New York's plans to protect the city from the dangers posed by rising seas and strengthening storms. In an appearance on the "Today" show, broadcast from the boardwalk at Seaside Heights on the Friday of Memorial Day weekend, the Governor refused to attribute Sandy to climate change. "I haven't been shown any definitive proof yet that that's what caused it," he said. "Listen, this is distraction," he went on. "I've got a place to rebuild here, and people want to talk to me about esoteric theories. We've got plenty of time to do that later on."



*"Read it in the hollow, affectless voice of a man
with nothing left to lose, Daddy."*

Owners of destroyed homes are mostly free to rebuild them on the same spot, although new floodplain maps have expanded the areas that require houses to be elevated, and, in some of the most vulnerable areas, raised on thirteen-foot stilts. The state has no plan to buy destroyed oceanfront properties and preserve them from development. Mark Mauriello, the former D.E.P. commissioner, told me, "Unfortunately, the Governor was so hellbent on getting things open, there was no discussion of acquisition and resettlement, and now there is no need, because the government is going to come in and do this four-billion-dollar-nourishment. But in five years we'll need it again." However, the state did set aside twenty-five million dollars of federal funds for a public-relations campaign, to let people know that the Shore was open for business. The theme of the campaign is "Stronger than the Storm."

On Memorial Day, after a cold and wet weekend, the beach at Sea Bright was lightly populated with families and small groups, finally enjoying some nice weather. No one was swim-

ming—the water was still too cold for that, and the uncertainty about what storm debris might remain on the ocean floor wasn't exactly tempting people in, either—but children played at the water's edge, their feet slapping the slick, wet, fresh sand as they raced the incoming waves.

I sat there, staring out at the ocean. I picked up a handful of sand and let it run through my fingers. The color was yellowish brown and the grain was a little coarser than usual, owing to the chunks of brownish crystal in it. There was also some pea gravel, and black specks of what appeared to be obsidian. But the beach's slope felt good to lie back on, and the sand molded to my hip when I turned on my side to read.

Overhead, banner planes towed news of extraordinary holiday mattress deals, while bored-looking lifeguards, with no one to save, lounged in their chairs. There was the coconut smell of tanning lotion. Someone broke out a paddle-ball set, and with the lazy thwack of the rubber ball against the wooden paddles it was possible to believe that life is a beach after all. ♦